

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE



In re application of

Docket No. L10389/A7942

Richard J. McCurdy

Appln. No.: 09/662,181

Group Art Unit: 1762

Confirmation No.: 2443

Examiner: B. Chen

Filed: September 14, 2000

For: **METHOD FOR DEPOSITING TITANIUM OXIDE COATINGS ON FLAT GLASS
AND THE RESULTING COATED GLASS**

SUPPLEMENTAL DECLARATION UNDER 37 C.F.R. § 1.132

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

I, Richard J. McCurdy, hereby declare and state:

1. I am the same Richard J. McCurdy as identified in the Declaration Under 37 C.F.R 1.132 Declaration (hereinafter "my original Declaration") filed in the above-referenced application on June 20, 2003.

2. I have reviewed the Final Office Action dated August 29, 2003, issued in connection with the above-referenced application as well as the Response Under 37 C.F.R. § 1.116 filed October 27, 2003, and the Advisory Action dated January 30, 2004.

3. Referring to page 3 of the Advisory Action, it is indicated that Applicant has not rebutted the Examiner's position with respect to differences between the coating process as described in Example 1 of the above referenced application and the coating process referred to at paragraph 7 lines 1 and 2 of my original Declaration. There were no variations in the procedures followed; the process referred to was as described at page 16 line 15, to page 18, line 11 of the above referenced application.

4. My original Declaration does refer to minor variations between the two samples (Samples 1 and 2) produced when repeating the procedure according to Example 1. These

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variations were apparent only as slight variations in reflection of the coated samples and are attributable to inconsequential changes in film thickness resulting from inevitable minor variations in process conditions which, however, would not affect either the crystallinity or the photocatalytic nature of the films.

5. Further, I would like to point out that three different samples were produced for the declaration: the first two samples (Samples 1 and 2) were produced according to Example 1 of the above-referenced application including linespeed and the third sample (Sample 3) was produced according to the same Example 1 of the above-referenced application but with a slower linespeed. By slowing the linespeed, which is a common technique in the art, the substrate is exposed to the chemical flows for a longer period of time, which consequently grows a thicker film. Reducing the linespeed was done for Sample 3 in order to produce the same coating as the first two but with an increased thickness in order to improve the signal-to-noise ratio of the X-ray diffraction measurement that is used to establish crystallinity.

6. Attachments A and B of my original Declaration (attached again hereto for convenience) are the X-ray diffraction patterns of two of the samples. Attachment A has the X-ray diffraction spectrum of one of the thin samples (Sample 1), while Attachment B contains the X-ray spectrum for the thicker sample, Sample 3. One can see from Attachment A that there is a broad diffraction peak centered at roughly 25 degrees, the location of the principal peak of anatase titanium oxide. The standard library power diffraction file for anatase titanium oxide is also shown in the figure (file 21-1272) for reference. This is consistent with our statements that by replicating Example 1 of the above-referenced application, an anatase titanium oxide coating was produced. The X-ray diffraction pattern for Sample 3 is shown in Attachment B. Here one finds that not only is the primary peak of the titanium oxide diffraction pattern found (as in the Sample 1) but we are also seeing secondary and tertiary peaks in Sample 3 that further confirm the coating identification as anatase titanium oxide. With the thicker film made by decreasing the linespeed, one sees that the signal-to-noise ratio of the spectra is significantly improved as well as a sharpening of the peaks. The peak width narrows as a result of the larger crystallites inherent in the thicker sample. In conclusion, both Samples 1 and 3 produced anatase titanium

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oxide films and the difference between the two samples is specifically due to the differences in film thickness of the two samples.

7. The photocatalytic self-cleaning features were also measured for Samples 1 and 3, which show high photocatalytic self-cleaning activity (*see, Table I and II and ¶¶ 10 and 11 of my original Declaration*). All samples were found to be photocatalytically active with >99% stearic acid removal after 60 minutes.

8. The Examiner also suggests that the samples did not have a silica coating. I can attest that silica coated glass substrates were used for the production of all Samples of my original Declaration.

9. The Examiner also states that no mention of annealing properties, substrate purity, etc. were made and that any or all of which can account for the claimed characteristics. The Examiner is correct that annealing characteristics (especially a secondary separate annealing cycle) can affect the photocatalytic activity of some types of titanium oxide self-cleaning coatings. This effect is most often seen with low temperature deposited films (<600C) when combined with an annealing temperature which exceeds the deposited temperature or when the annealing temperature is similar but annealing time significantly longer than the cooling during the initial preparation. See, for example, U.S. Patent No. 6,027,766, in particular, col. 7, line 36 through col. 8, line 7. This secondary annealing cycle is commonly used with films that have little or no self-cleaning features as deposited where the annealing step is critical to either crystallize the film into anatase titanium oxide or to increase the anatase content of the crystalline film to produce the required self-cleaning functions. The films described in both Example 1 of the above-referenced application and my original Declaration are high content anatase titanium oxide as deposited and as such do not need a subsequent annealing step. The films were cooled down in ambient air under no special conditions after deposition demonstrating that the criticality of annealing parameters for my films on the self-cleaning function is nonexistent. Similarly, the other stated parameters by the Examiner are also not material to the invention. Substrate purity is not important as the films are deposited on top of a silica coating that inhibits effects of the substrate. Substrate crystallinity is not important as both

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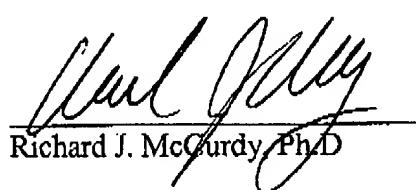
the float glass substrate and the silica underlayer are both amorphous. Processing pressure and process purity are equally irrelevant as film growth rate and film properties are insensitive to changes in process pressure in the range of interest (near atmospheric pressure) and reagents used in the invention were common reagent grade chemicals with no subsequent purification prior to use. In summary, the processes described in Example 1 of the above referenced application and my original Declaration are sufficient for one skilled in the art to produce an anatase titanium oxide coated piece of glass with self-cleaning photocatalytic activity. Minor process changes may affect film thickness or optical properties such as reflection but not the intrinsic crystal structure or photocatalytic activity of the product.

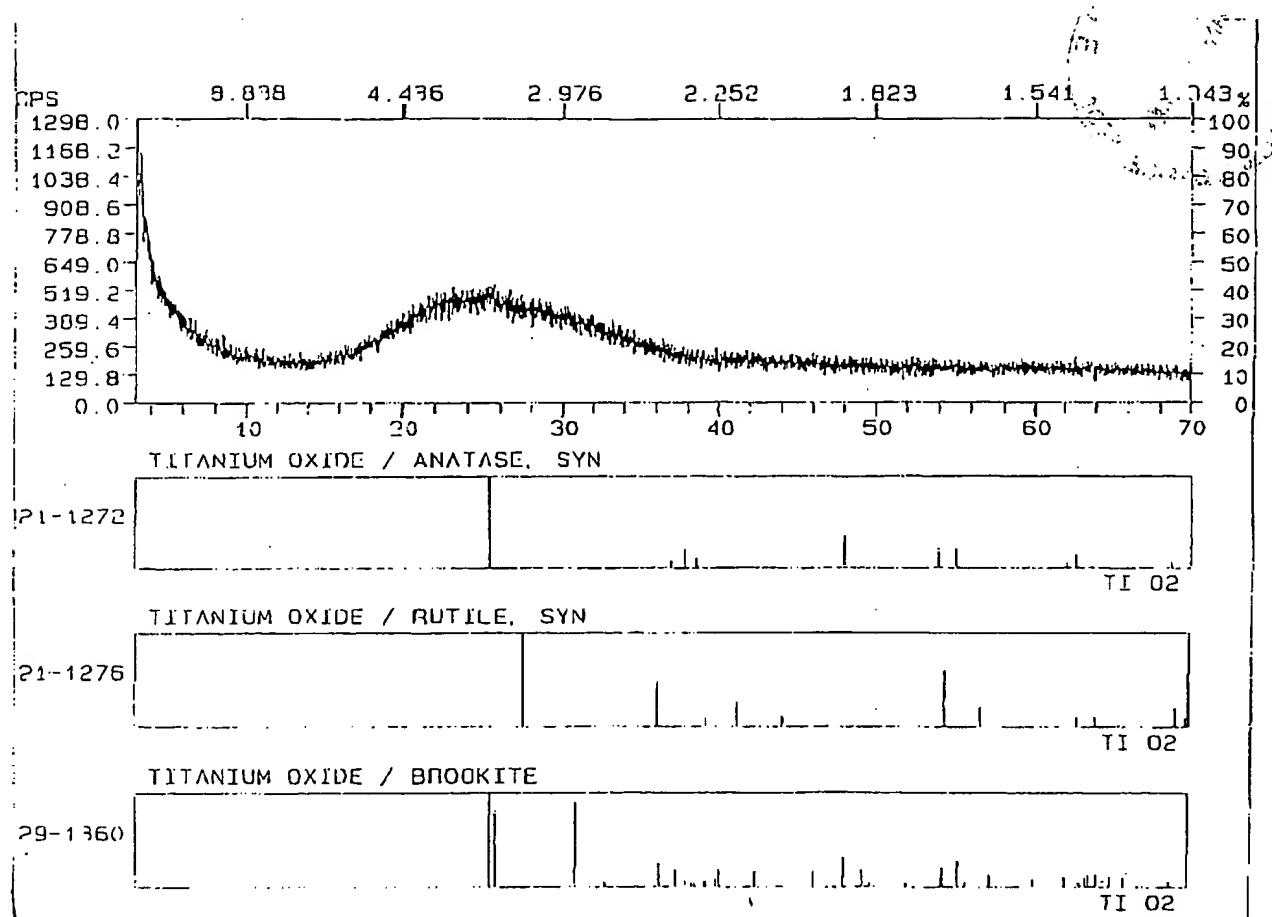
10. It should be noted that there is an error in the sample numbering in paragraph 12 of my original declaration. The last sentence of this paragraph refers to Samples 4, 5 and 7. This sentence should have referred to Samples 1, 2 and 3, respectively. This error in the designations of the samples occurred because seven samples were prepared in connections with the experimental work that is reported in my original Declaration. The first three samples were taken before the system reached steady state. The fourth and fifth samples were taken when the system reached steady state. Thus, because it would not have been appropriate to include the first three samples in the data discussed in my original Declaration, the fourth and fifth samples were designated Samples 1 and 2 and described as such in my original Declaration. Further, two samples were prepared at reduced linespeed in the experimental work that was the basis of my original Declaration. The first reduced linespeed sample was prepared at a line speed of 200 inches per minute (reduced from the linespeed of 300 inches per minute used in Example 1 of the above referenced application). However, in order to achieve the desired coating thickness and therefore be able to conduct the test needed to confirm the crystallinity of the deposited coating, the linespeed was further reduced to 100 inches per minute, and that sample was reported in my original Declaration as Sample 3.

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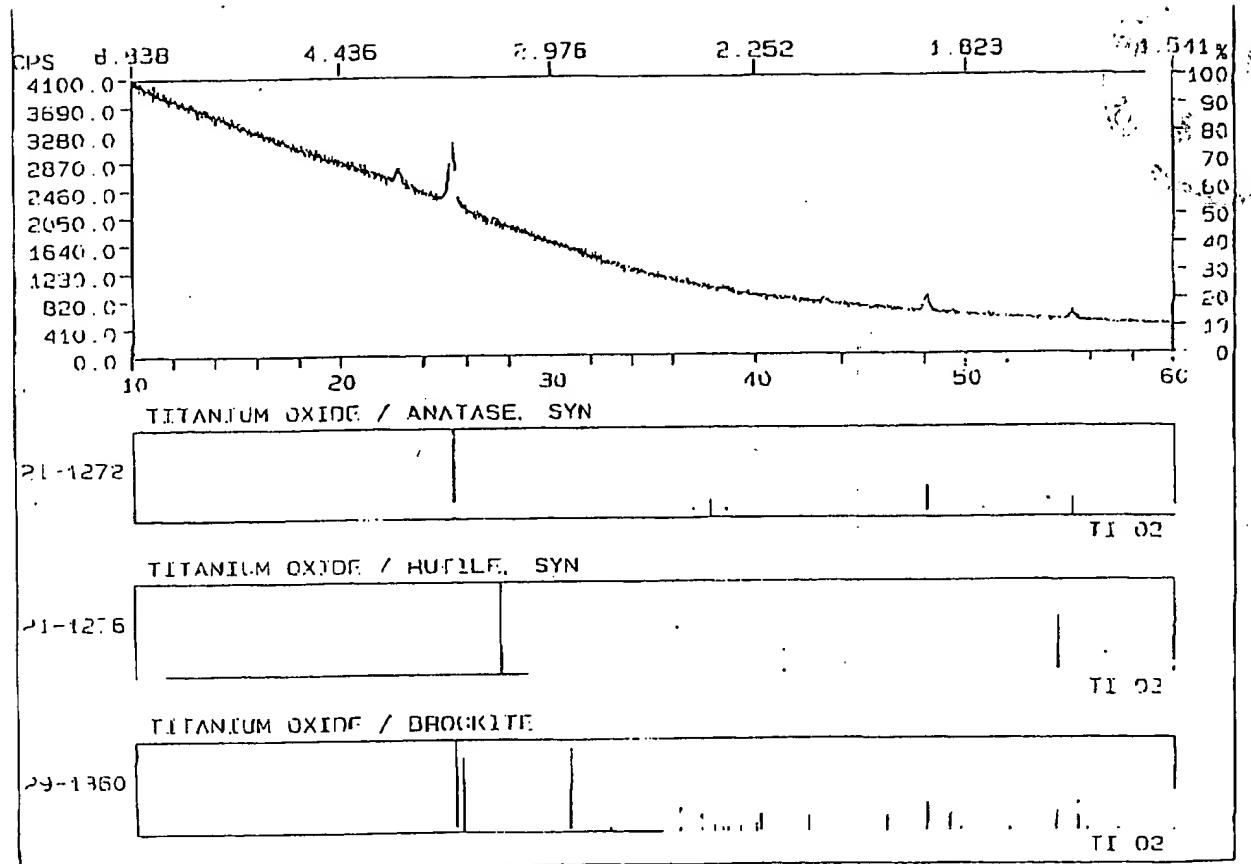
I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: FEB 29, 2004


Richard J. McCurdy, PhD



Attachment A



Attachment B